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Characterization of Exopolysaccharide-Producing Lactic Acid Bacteria of Technological Interest

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Objective: The characterization of lactic acid bacteria (LAB), belonging to Leuconostoc mesenteroides and Lactobacillus sakei species isolated from different ecosystems, and of their exopolysaccharides (EPS) produced in the presence of sucrose as carbon source.

Key Findings: LAB isolated from food products (camel and sheep milks, meat products and cider) were selected according to the level of production of EPS in both liquid as solid media. EPS were produced in the presence of sucrose, purified from bacterial culture supernatants by ethanol precipitation, dialyzed and lyophilized [1]. Methylation analysis and determination of monomer composition revealed that the EPS are homopolysaccharides (dextrans) with a main chain of glucopyranose units linked by α-(1,6) bonds, and partially branched in the O-3 position by a single α-glucopyranose unit [2]. The determination of the rheological properties of the dextrans showed that dextrans, under shear conditions, have a pseudoplastic behavior linked to a flexible chain influenced by the polymer concentrations. Size exclusion chromatography coupled with multiangle laser light scattering (SEC-MALLS) detection analysis [3] demonstrated that the dextrans had molecular masses between 1.74x108 Da and 4.41x108 Da. In addition, these dextrans clearly showed in vitro anti-inflammatory immunomodulatory activity in the THP-1 cell line. The ability of the dextran-producing LAB for binding to Caco-2 cells was strain dependent and in some cases negatively affected by the production of dextran as previously observed [4].

Conclusion: The LAB and theirs dextrans showed probiotic and technological properties that qualified them to be used in the agri-food for industry producing functional foods.

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Authorship: K. Zarour: Isolation, technological characterization of Leuconostoc strains from algerian milks and their exopolysaccharides. M.G. Llamas: Isolation, technological characterization of Leuconostoc and Lactobacillus strains from meat products and cider and their exopolysaccharides. R. Aznar provided the strains isolated from meat products and carried out a critical reading of the paper. M.T. Dueñas: contribution in interpretation of rheological analysis data of polymers produced by LAB. M. Kihal: contribution in isolation and phenotypic identification of Leuconostoc strains from Algerian food products. P. López: research direction and interpretation of the analytical data.

Keywords: Lactic acid bacteria, exopolysaccharides, dextrans, adhesion, immunomodulation.

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Seeking a Model for Immunonutrition: Exhausting Exercise in Rats

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Although a regular and moderate physical activity enhances body defences (Kruijsen-Jaarsma et al., 2013), the immune system is negatively impacted by exhausting exercise, conducting an increasing risk of opportunistic infections (Gleeson, 2007). This condition is therefore a challenge for immunonutrition, looking for appropriate diets that prevent, delay or inhibit the deficiencies in the immunity. Animal models in which an exercise-derived immunodepression could be reproduced are very limited. The aim of this study was to establish immune markers of exhausting exercise both in the systemic and mucosal lymphoid tissues of rats reflecting the depression of the immune function.

Young Wistar rats were trained in a treadmill for 4 weeks and, at the end, they were submitted to an exhaustion protocol in the same treadmill. Blood and faeces were collected throughout the study. Macrophages were isolated from peritoneal cavity and small intestine was dissected. In addition, the weight of gastrocnemius muscle, heart and lymphoid tissues were registered.